molded argillaceous honeycomb body is carried out by measuring a temperature of the extrusion-molded argillaceous honeycomb body and controlling supply of the microwaves in accordance with the measured temperature." Claims 2 and 3 depend from and incorporate all of the limitations of claim 4.

Ceramic honeycomb bodies formed by the method set forth in claim 4 provide distinct advantages over ceramic honeycomb bodies formed by conventional methods. In particular, the claimed method allows the prevention of cracking, wrinkling and other defects in the thinner skin portions of the ceramic honeycomb body and avoids problems, such as dielectric breakdown and undesirable discharge, to be avoided. Cracking, wrinkling and other defects in the thinner skin portions of the ceramic honeycomb body result from shrinkage differences caused by differences in drying rates for different portions of a ceramic honeycomb body. *See* Specification, page 1, lines 10-22. The claimed method dries a ceramic honeycomb body by applying a high humidity environment and heating by irradiating the honeycomb body with microwaves having a frequency of 1,000 to 10,000 MHz.

By maintaining a high humidity environment, the difference between the drying rates for the outer peripheral surfaces of the ceramic honeycomb body and for the interior of the ceramic honeycomb body can be reduced, and deformation of the outer surface due to drying too quickly can be prevented. *See* Specification, page 2, lines 19-27. In addition, the difference between shrinkage rates of the outer peripheral surfaces and the interior of the ceramic honeycomb body can be reduced by this method, and cracking, wrinkling and other defects can be prevented. *See* Specification, page 2, lines 30-37.

Heating by microwave irradiation allows a high-humidity environment to be maintained during the drying process. Conventional high frequency current methods require electrodes to be placed near the ceramic honeycomb body to be dried, and problems such as discharge and dielectric breakdown between the electrodes can occur in high humidity

environments. *See* Specification, page 3, lines 5-11. Microwaves, as required by claim 4, do not require electrodes and can heat a ceramic honeycomb body in a high humidity environment. *See* Specification, page 3, lines 12-16.

In addition, the claimed method requires that the temperature of the ceramic honeycomb body is monitored during the drying process, and that the microwave supply is controlled. By controlling the supply of microwaves based on the measured ceramic honeycomb body temperature, overdrying can be prevented. *See* Specification, page 4, lines 17-34.

The Office Action takes the position that claim 4, and dependent claims 2 and 3 would have been obvious over Andou, in view of Davidson, Chyung and, optionally, Hallier. Applicants respectfully disagree.

Andou, the primary reference on which the Office Action relies, teaches ceramic honeycomb bodies, having partition walls with thicknesses of from 0.05 to 0.13 mm, that are produced by extrusion molding clay rods into honeycomb supports and drying the honeycomb supports. *See* Andou, Abstract, col. 6, lines 35-44. Andou teaches that the honeycomb support is "uniformly heated to evaporate moisture" and thereafter fired. *See* Andou, col. 6, lines 40-44. That is, Andou teaches driving off moisture, without controlling or monitoring the humidity of the drying atmosphere. The Office Action admits that Andou does not teach exposing a ceramic honeycomb body to a high humidity environment. Applicants respectfully submit that, rather than teaching that ceramic honeycomb bodies are dried in an atmosphere including a high level of humidity, as required by claim 4, Andou teaches away from drying a ceramic honeycomb body to a high humidity environment by its teachings of uniformly heating, to evaporate moisture, and then firing the ceramic honeycomb bodies.

In addition, the Office Action admits that Andou does not teach irradiating a honeycomb body with microwaves, particularly microwaves in a frequency range of from

1,000 to 10,000 MHz, and also does not teach measuring honeycomb body temperature during drying and controlling the supply of microwaves heating the honeycomb body, based on the measured temperature.

For at least these reasons, Andou alone cannot support a rejection of claim 4 or its dependent claims. Davidson does not remedy the shortcomings of Andou.

Davidson teaches drying extrudable compositions under high humidity conditions to avoid over-drying. *See* Davidson, col. 3, lines 55-58. However, Davidson does not disclose or suggest that defects such as wrinkling or cracking in the thinner skin portions of the ceramic honeycomb body can be prevented by drying under high humidity conditions. *See generally,* Davidson.

In light of the teachings of Andou away from drying a ceramic honeycomb body in a high humidity environment, one of ordinary skill in the art would not have been motivated to combine Andou and Davidson to provide a method for drying a ceramic honeycomb body in a high humidity environment. That is, one of ordinary skill would not be motivated to incorporate a high humidity drying environment, such as that disclosed by Davidson, into a drying method that teaches removing moisture, such as that disclosed in Andou.

In addition, Davidson, like Andou, does not disclose or suggest irradiating a honeycomb body with microwaves, particularly microwaves in a frequency range of from 1,000 to 10,000 MHz, and does not teach measuring a honeycomb body temperature drying and controlling drying the supply of microwaves heating the honeycomb body, based on the measured temperature, as required by claim 4. *See generally,* Davidson.

For at least these reasons, Andou and Davidson, individually and in combination, cannot support a rejection of claim 4 or its dependent claims. Chyung does not remedy the shortcomings of Andou and Davidson.

Chyung teaches drying thick walled shapes, such as boards, and extruded honeycomb structures by applying microwave radiation. *See* Chyung, Abstract; col. 9, line 67 - col. 10, line 4. However, Chyung does not disclose or suggest drying honeycomb bodies under high humidity conditions or that defects such as wrinkling or cracking in the thinner skin portions of the ceramic honeycomb body can be prevented by drying under high humidity conditions. *See generally,* Chyung.

In addition, Chyung discloses drying by microwave irradiation, but, like Andou and Davidson, does not disclose or suggest irradiating honeycomb bodies with microwave radiation in a frequency range of from 1,000 to 10,000 MHz, and does not teach measuring a honeycomb body temperature and controlling the microwave supply based on the measured temperature. *See generally,* Chyung.

For at least these reasons, Andou, Davidson and Chyung, individually and in combination, cannot support a rejection of claim 4 or its dependent claims. Hallier does not remedy the shortcomings of Andou, Davidson and Chyung.

Hallier discloses pre-drying ceramic pieces, such as porcelain plates, by microwave heating in an atmosphere including humidity from water removed from the ceramic pieces. *See* Hallier, Abstract; col. 2, lines 55-58. Microwaves having a frequency of 2,450 MHz are disclosed as effective for heating porcelain ceramics in drying processes. *See* Hallier, col. 1, lines 8-12. However, Hallier does not disclose or suggest drying honeycomb bodies, or other thin walled structures, under high humidity conditions or that defects such as wrinkling or cracking in the thinner skin portions of ceramic honeycomb bodies can be prevented by drying under high humidity conditions. *See generally,* Hallier.

Hallier, like Andoue, Davidson and Chyung, also does not disclose or suggest measuring the temperature a honeycomb body - or any ceramic structure - during drying and

controlling the supply of microwaves heating the honeycomb body, based on the measured temperature, as required by claim 4. *See generally,* Hallier.

For at least these reasons, Andou, Davidson, Chyung and Hallier, individually and in combination, cannot support a rejection of claim 4 or its dependent claims

For at least the reasons set forth above, Applicants respectfully submit that independent claim 4 and dependent claims 2 and 3 are patentable over Andou, Davidson, Chyung and Hallier, individually and in combination. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

The Office Action rejects claim 5 under 35 U.S.C. §103(a) over Andou, Davidson, Chyung and Hallier, as applied to claim 4, and further in view of U.S. Patent No. 3,187,574 to Mason et al. or U.S. Patent No. 4,3115,150 to Darringer et al. Applicants respectfully traverse this rejection.

Claim 5 depends from and incorporates all of the limitations of claim 4, which is set forth above.

For at least the reasons set forth above, no combination of Andou, Davidson, Chyung and Hallier would have rendered claim 4, or its dependent claims, obvious. Mason and Darringer cannot remedy the shortcomings of Andou, Davidson, Chyung and Hallier.

Mason and Darringer teach infrared optical pyrometers and thermometers, respectively. Specifically, Mason teaches infrared optical pyrometers that can be calibrated for high and low temperatures and that can be used to take accurate temperature readings of high temperature equipment such as kilns and ovens. *See* Mason, col. 1, lines 9-18. That is, Mason teaches a pyrometer that can be used to measure the temperature of an oven. However, Mason does not include any teachings relating to the humidity conditions inside the oven during heating, relating to the types of bodies heated in the oven, or relating to measuring the temperature of a body within an oven during heating. *See generally*, Mason.

Darringer teaches optical thermometers for determining temperatures of specific areas by measuring infrared radiation from that area. *See* Darringer, Abstract. In particular, Darringer discloses the structure of an infrared thermometer that uses a light (optical) targeting system. *See* Darringer, col. 1, lines 5-11; col. 2, line 53 - col. 3, line 10. However, Darringer does not include any teachings relating to the humidity conditions surrounding the area being measured, relating to measuring the temperature of a body, or relating to types of areas or bodies the temperatures of which could be determined by the infrared thermometer. *See generally*, Darringer.

Because the Mason and Darringer references, like the Andou, Davidson, Chung and Hallier references discussed above, do not teach or suggest "exposing the extrusion-molded argillaceous honeycomb body to a high-humidity ambience of not less than 70 % in humidity; and irradiating the extrusion-molded argillaceous honeycomb body with microwaves having a frequency of 1,000 to 10,000 MHz" or "controlling supply of the microwaves in accordance with the measured temperature [of the extrusion-molded argillaceous honeycomb body]," as set forth in claim 4, Andou, Davidson, Chyung, Hallier, Mason and Darringer, individually and in combination, cannot support a rejection of claim 4, or its dependent claim 5.

Applicants respectfully submit that claim 5 is patentable over Andou, Davidson, Chyung, Hallier, Mason and Darringer, individually and in combination. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 2-5 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Julie M. Seaman
Registration No. 51,156

JAO:JMS/jms

Date: March 2, 2005

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461